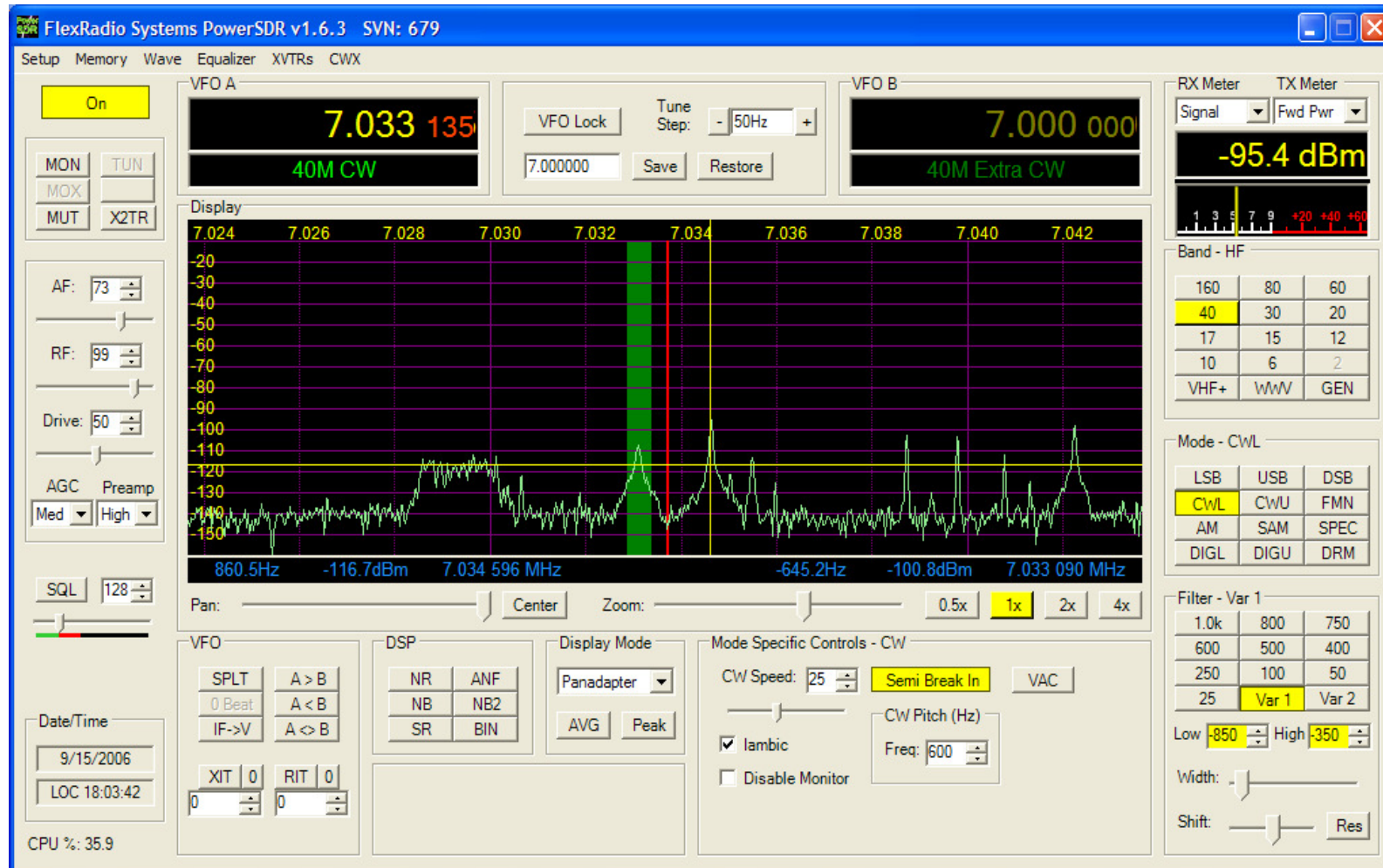


SDRs Enter the Second Generation

Or Maybe the Second
Thousandth Generation...

Gerald Youngblood, K5SDR

The Visual Radio: *Real Radios Don't Need Knobs*



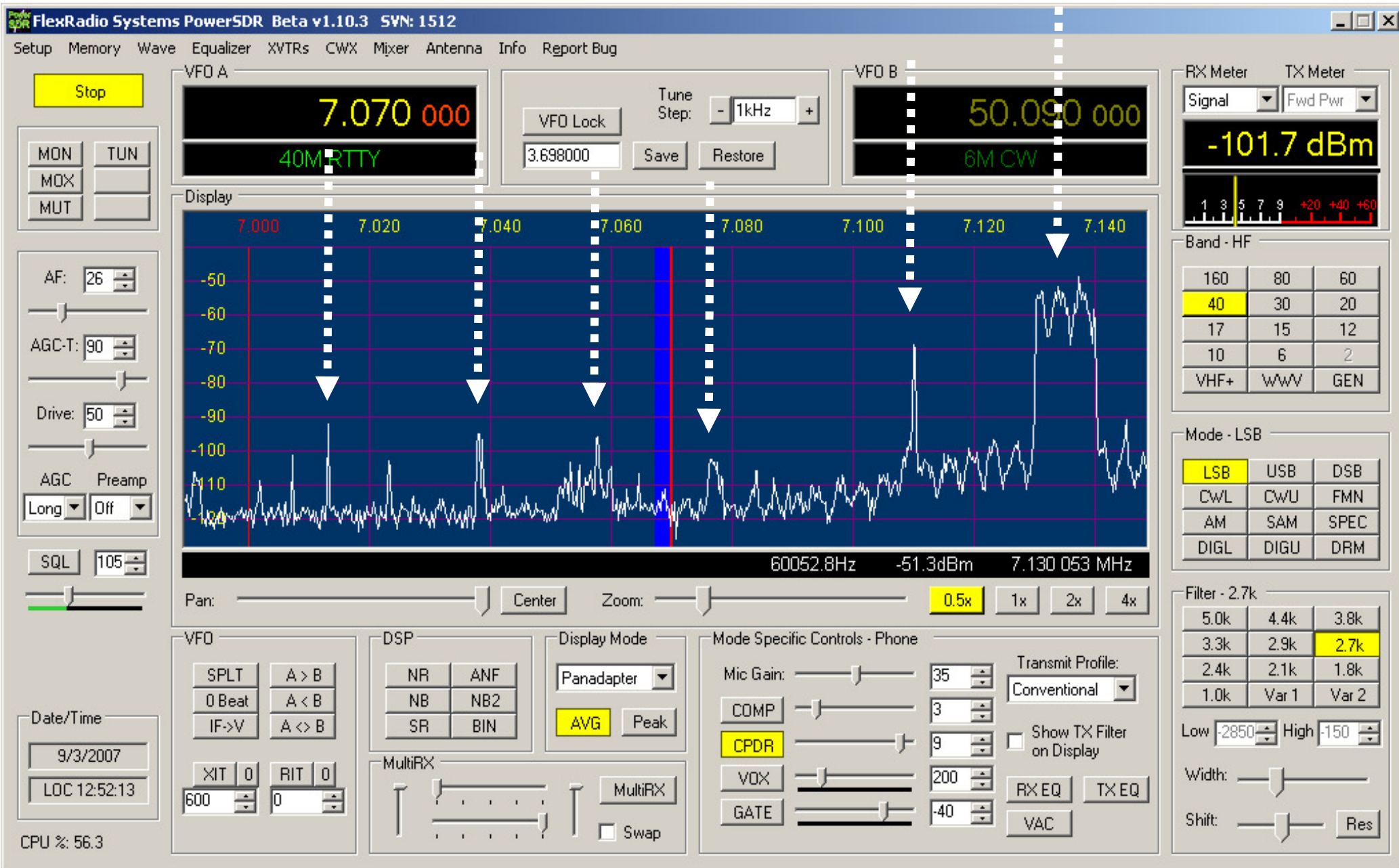
CW

Digi

SSB

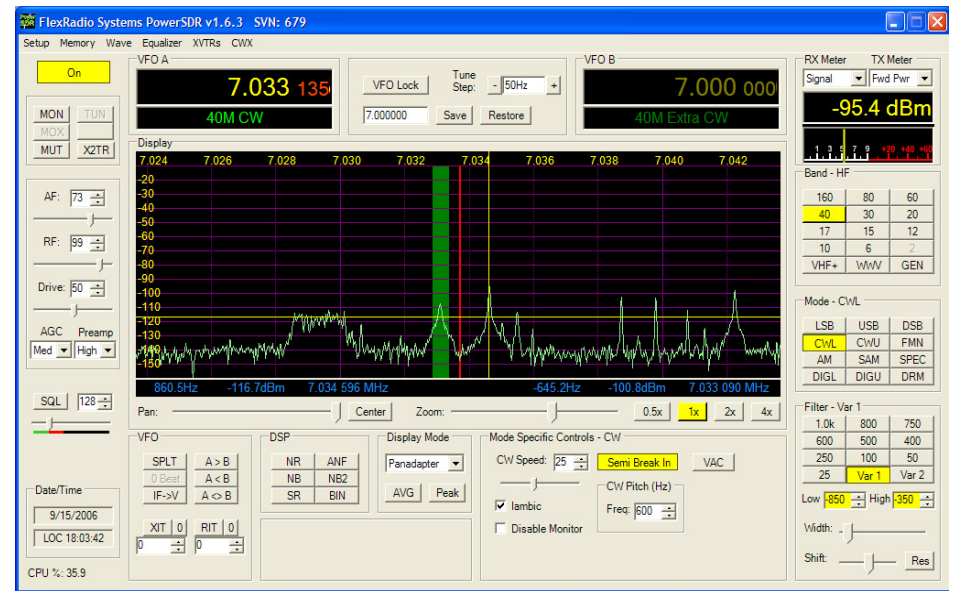
AM

DRM



PowerSDR™ Open Source SDR

- GPL Open Source License
- All DSP, Control, UI
- Worldwide Contributions
- Six Years Constant Improvement
- Open SVN Access



FLEX-5000A Second Generation SDR Ups the Ante



FLEX-5000A Key Features

- Same GPL PowerSDR
- Single FireWire Connect
- >96 dB IMD DR3 2kHz
- Second Hardware RX Option
- Full Duplex/Triplex
- 100W 160-6m
- Transverter/Sat Ready
- Extensive AF/RF IO
- FlexWire Bus for Accessories
- Built In Test Equipment
- 99.9% Software Calibrated



Two-Tone, 3rd Order Dynamic Range per Sherwood Engineering

Manufacturer/Transceiver	IMD DR3 @ 2 kHz Spacing
FlexRadio/FLEX-5000	96 dB
Ten-Tec/Orion II	95 dB
Ten-Tec/Orion I	93 dB
Kenwood/TS-830	81 dB
Icom/IC-7800	80 dB
Elecraft/K2	80 dB
Ten-Tec/Omni VII	80 dB
Icom/IC756 Pro III	75 dB
Yaesu/FT-1000 MP MKV Field	69 dB

Fully Integrated Models

- FLEX-5000C – A Model Plus:
 - Integrated Core2 Duo PC
 - Rack Mount Option
 - Q4 2007 Delivery
- FLEX-5000D – C Model Plus:
 - 9" Touch Screen
 - Integrated Tuning Knob
 - Standard RX2 and ATU
 - 300W PA
 - 7W Speaker
 - AC Supply
 - Q3 2008 Delivery



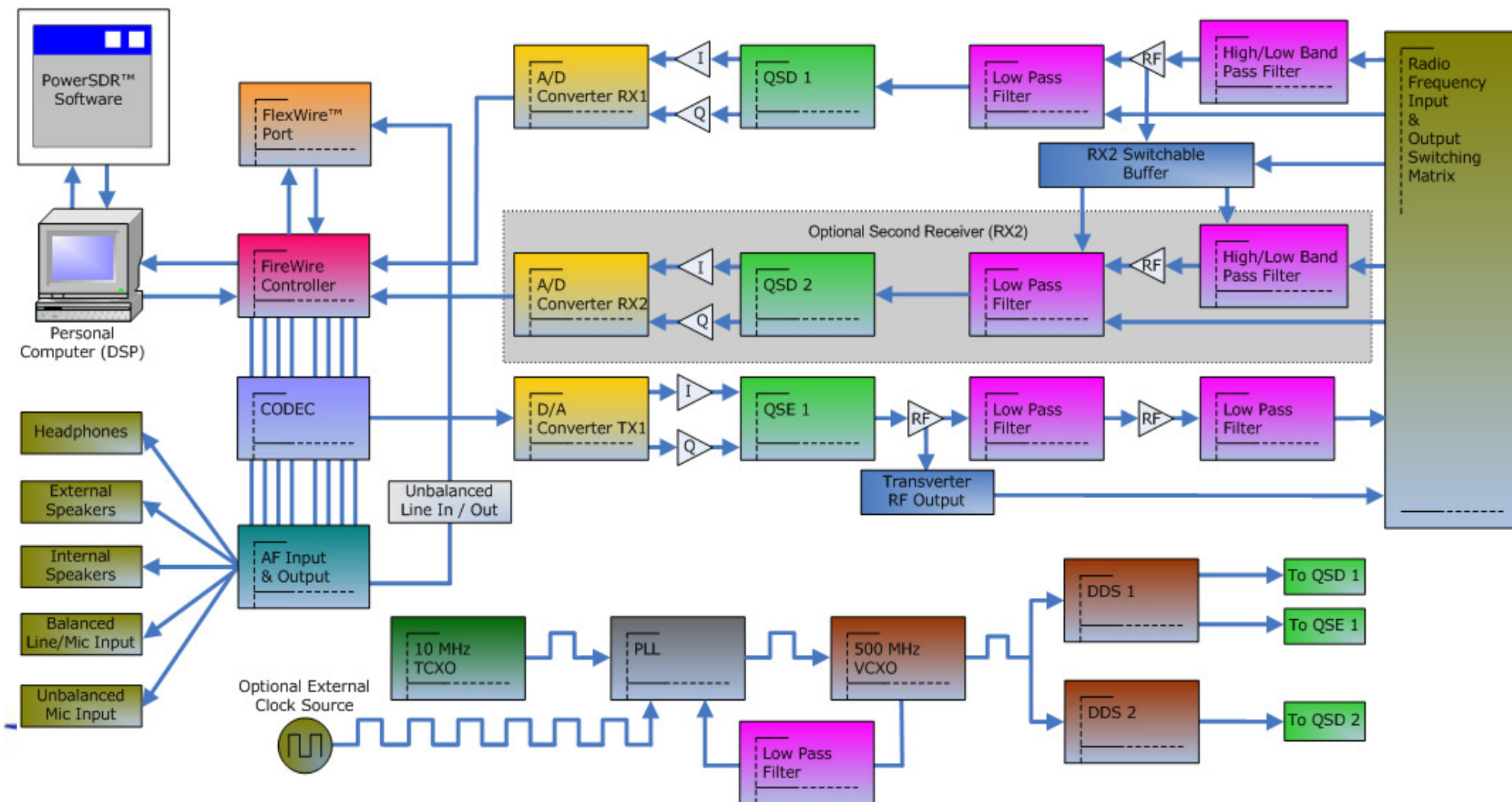


FlexRadio Systems FLEX-5000™

Full Duplex / Triplex Architecture

(Block Diagram)

Monday, May 28, 2007
© 2007 FlexRadio Systems



FLEXable Transverter Control

XVTR Setup

Enabled	Band Button	UCB Address	Button Text	LO Offset (MHz)	LO Error (kHz)	Begin Freq (MHz)	End Freq (MHz)	RX Gain (dB)	RX Only	Power	XVTR RF TX
☒	0	0	2m	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☒	1	1	70cm	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	2	2	2	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	3	3	3	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	4	4	4	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	5	5	5	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	6	6	6	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	7	7	7	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	8	8	8	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	9	9	9	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	10	10	10	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	11	11	11	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	12	12	12	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐	13	13	13	0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐		14		0.0	0.000	0.000000	0.000000	0.0	☐	100	☐
☐		15		0.0	0.000	0.000000	0.000000	0.0	☐	100	☐

☐ Hide Tune Step

Planned VHF/UHF Module

- 70 cm & 2m Integrated Transverters
- Full Duplex/Simplex Operation
- Drop-In Upgrade to all Models
- Power Out TBD (10W Min)
- Available Q3 2008

SDRs Enter the Second Generation

Or Maybe the Second
Thousandth Generation...

Gerald Youngblood, K5SDR

Software Defined vs. Controlled

- Controlled

- PC Control of Fixed Radio Capabilities

- Defined

- 100% of Modulation, Demodulation and Control Capabilities Software Defined, Thus Upgradeable

Glass vs. Façade

- Flexible
- Visual
- Clean vs. cluttered
- Open to Future
- Fixed
- Blind
- Cluttered
- You're Stuck

Software vs. Firmware

- Flexible
- Open
- Independent
- Constant Improvement
- Limited
- Proprietary
- Dependent
- You're Stuck

PC vs. DSP

- Industry Standard
- Expandable
- Obsolescence
Unlikely
- Keeps Getting Better
- Proprietary
- Fixed
- Obsolescence
Certain
- You're Stuck

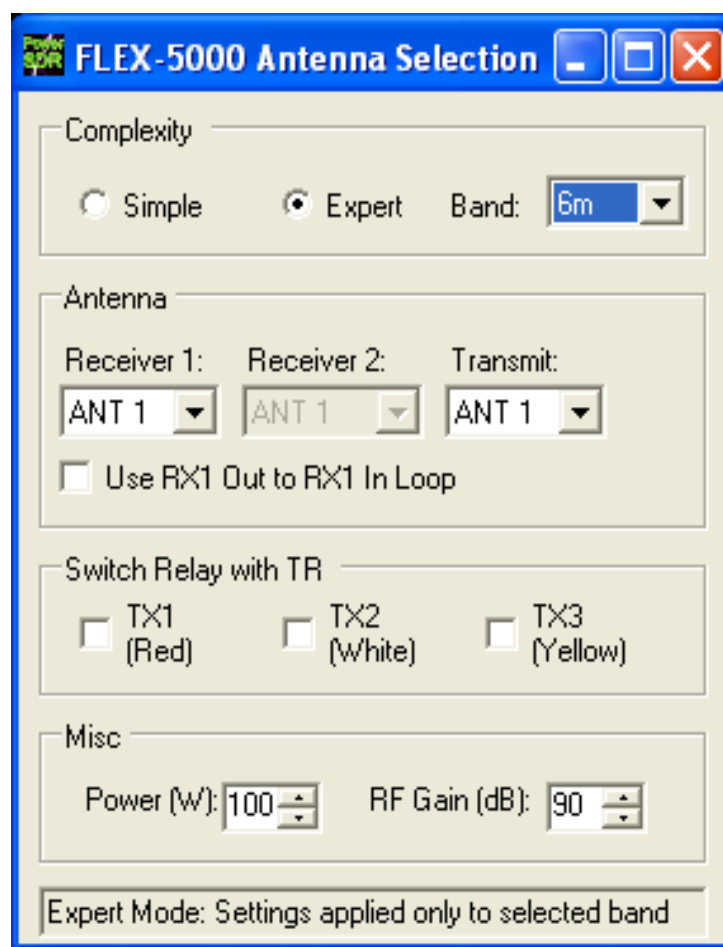
SDR vs. Legacy

- One Step RF → AF
 - Lower Noise
 - Lower Distortion
- Bullet Proof
- Lots of Analog
 - More Noise
 - More Distortion
- Requires “Roofing”

Visual vs. Blind

- See-em → Work-em
- 20-20
- Complete Picture
- See and Pounce
- No See → No Work
- 70-70
- Guesswork
- Twiddle and Fiddle

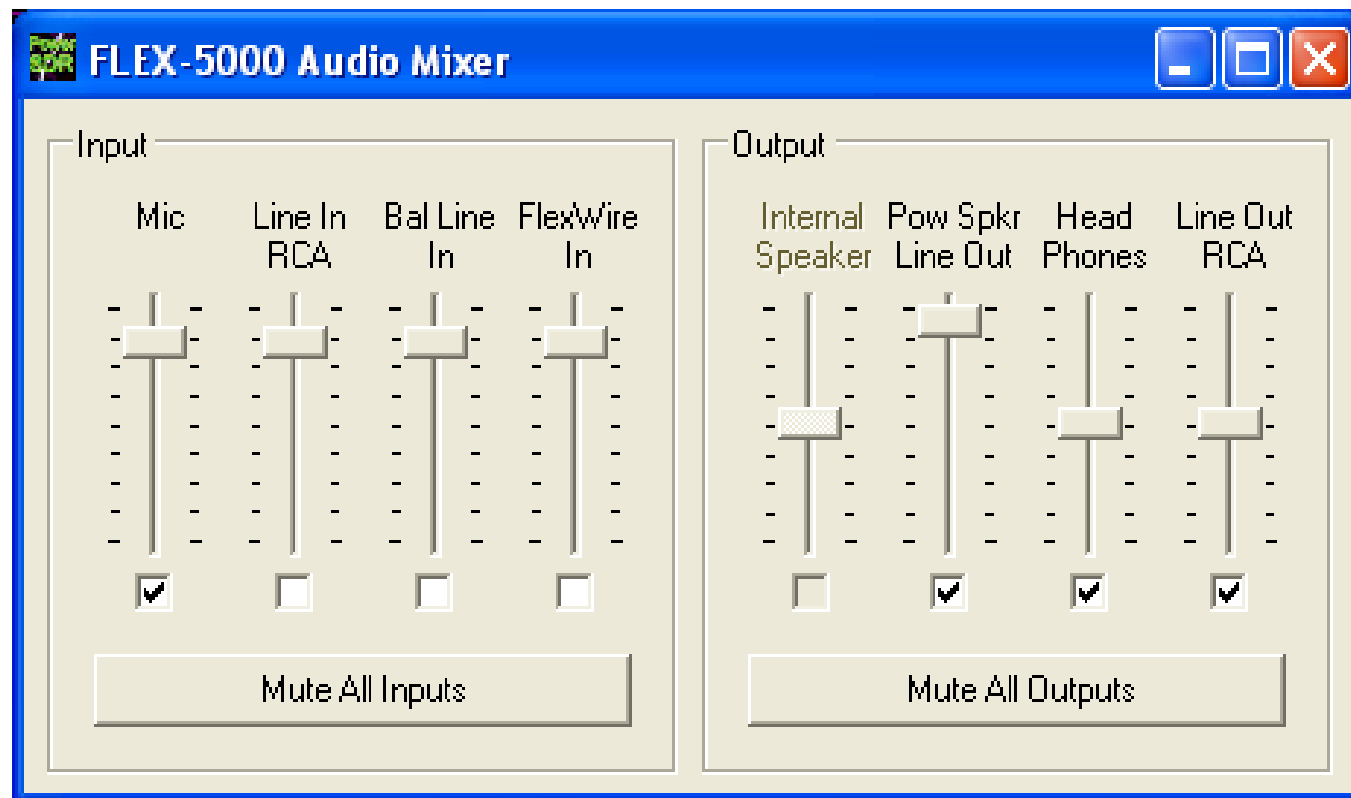
FLEXable Antenna/Power Control



The screenshot shows a software window titled "FLEX-5000 Antenna Selection". It contains several sections for configuring the radio's antenna and power settings.

- Complexity:** Two radio buttons are present: "Simple" (unselected) and "Expert" (selected). To the right is a "Band:" dropdown menu currently set to "6m".
- Antenna:** This section contains three dropdown menus labeled "Receiver 1:", "Receiver 2:", and "Transmit:". All three are currently set to "ANT 1". Below these is a checkbox labeled "Use RX1 Out to RX1 In Loop" which is currently unchecked.
- Switch Relay with TR:** This section contains three checkboxes: "TX1 (Red)", "TX2 (White)", and "TX3 (Yellow)". All three are currently unchecked.
- Misc:** This section contains two numeric input fields: "Power (W):" set to 100 and "RF Gain (dB):" set to 90.
- Expert Mode:** A text box at the bottom of the window contains the text "Expert Mode: Settings applied only to selected band".

FLEXable Audio Control



FLEXable Diagnostics

FLEX-5000 Debug

Low Level Hardware Control

Switches

Run Imp	☐ Impulse	☐ External Ref.	☐ RX1 Ext Ant	☐ XVEN
☐ Test	☐ XVTXEN	☐ Int. Speaker	☐ TR (Receive)	☐ XVCOM
☐ Gen	☒ QSD	☐ Headphone	☐ XVTR	☐ EN 2M
☐ Sig	☐ QSE	☐ RX2	☐ Int LED	☐ KEY 2M
☒ Fan	☐ RCA TX1	☐ RCA TX2	☐ RCA TX3	☐ TX MON
☐ Bias	☐ Off	☐ FPLED	☐ CTS	☐ RTS
☐ Reset	☐ Pwr Button			

Scanner

Start: 1.000000	Stop: 55.000000	Scan A
Step: 0.100000	Delay: 250	
Start: 1.000000	Stop: 55.000000	Scan B
Step: 0.100000	Delay: 250	

Key

Dot	Dash	RCA	Mic	☐ Poll
------------------------------------	-------------------------------------	------------------------------------	------------------------------------	-------------------------------

Driver Bias

Q2 Coarse: 217
Q2 Fine: 117
Q3 Coarse: 226
Q3 Fine: 129

Final Bias

Q4 Coarse: 236
Q4 Fine: 122
Q1 Coarse: 236
Q1 Fine: 123

Carrier Null

0: 128
1: 128
2: 128
3: 128

PLL

☒ Enable

PLL Clock: 10 CP Mode: Norma

Off

☒ PFD Polarity ☐ Poll

ADC

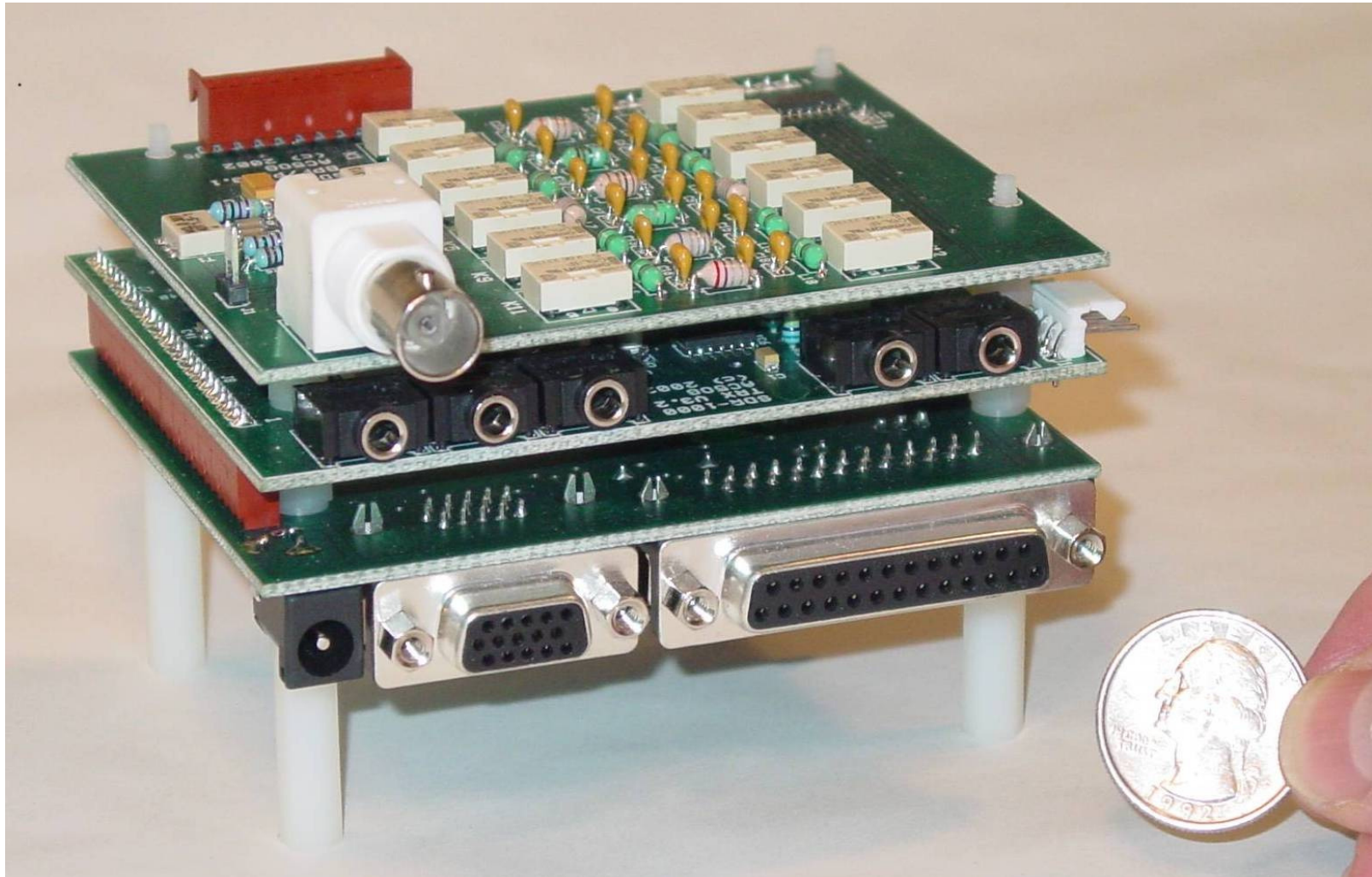
Chan: Final Bias

0.031 A ☐ Poll

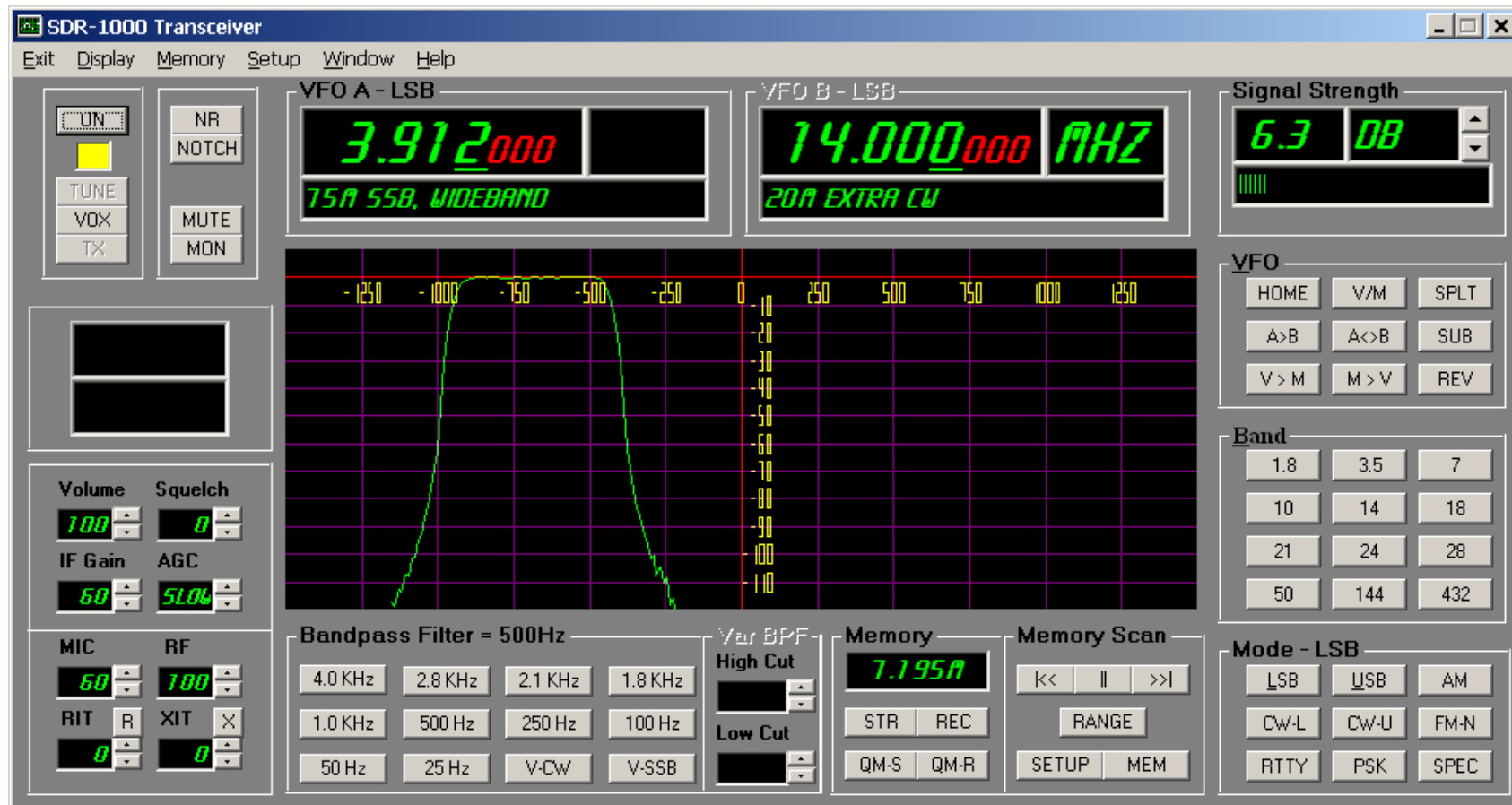
Freq Control

RX1: 7.000000	TX/Gen: 6.990000
☐ Filter Bypass	☐ Filter Bypass
☐ PA Filter 6m	

Original SDR-1000



Original SDRConsole



First Generation SDR-1000 Keeps Getting Better...

- Second Generation Benefits First Generation
- Improved CW
- Enhanced calibration
- Sub Receiver
- Improved Compander
- HPSSDR Janus/Ozy Support
- More to come

